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8. NORTH ATLANTIC OCEANIC PROCEDURES

8.1. INTRODUCTION

- The vertical dimensions of MNPS airspace is between FL285 and FL 420. Normally used cruise levels are from **FL290 to FL410 inclusive**.
- The lateral dimensions include the following Control Areas (CTAs):
 - Gander, Shanwick, Santa Maria and New York Oceanic.
- Pilots may fly across the North Atlantic within MNPS airspace only if they are in possession of the appropriate MNPS and RVSM approvals issued by the state of registry of the aircraft or by the state of the operator.

8.2. NAVIGATION REQUIREMENTS

8.2.1. Longitudinal navigation

- Longitudinal separation between aircraft is achieved by the application of the Mach Number Technique with the separation minima expressed in clock minutes.
- During pre-flight, the clock must be checked to display accurate UTC time.

8.2.2. Lateral navigation.

- The aircraft must be equipped with two long range navigation systems (LRNSs)
- A LRNS may be one of the following:
 - one inertial navigation system
 - one global navigation satellite system (GNSS) or
 - one navigation system using the inputs of one or more inertial reference systems (IRSSs).
- Each LRNS must be capable of providing a continuous indication to the flight crew of the aircraft position relative to desired track.
- It is highly desirable that the navigation system employed for the provision of steering guidance is capable of being coupled to the autopilot.

8.3. THE ORGANIZED TRACK SYSTEM (OTS)

8.3.1. General

- There are two major alternating flows across the North Atlantic airspace:
 - a westbound flow departing Europe in the morning, and
 - an eastbound flow departing North America in the evening.
- Due to the energetic nature of the NAT weather patterns, including the presence of jet streams, consecutive eastbound and westbound minimum time tracks are seldom equal. The creation of a different organized track system is therefore necessary for each of the flows.
- Separate organized track structures are published each day for eastbound and westbound flows. These track structures are referred to as the **Organized Track System or OTS**.

8.3.2. The NAT track message

- OTS is promulgated by means of the NAT track message, it gives full details of the co-ordinates of the organized tracks, flight levels and in most cases there are also details of domestic entry and exit routings associated with individual tracks (e.g. North American Routings NARs).
- In the westbound (daytime) system the track most northerly at its point of origin, is designated as Track A and the next most northerly as Track B etc.
- In the eastbound (night time) system the most southerly track at its point of origin is designated as Track Z and the next most southerly track as Track Y etc.
- Each NAT track message is identified by means of a 3 digit **Track Message Identification Number (TMI)** equivalent to the Julian calendar date. OTS effective on 1st February will be identified by TMI 032 (32nd day of the year).
- An alphabet added to the end of a TMI (032A) number signifies that the NAT track has been amended and subsequently re-issued.
- The remarks section may vary from day to day. The remarks include details of special flight planning restrictions that may be in force and in the case of the night time eastbound OTS message; they include information on clearance delivery frequency assignments.

8.3.3. Hours of validity

- Day-time OTS 1130UTC to 1900UTC at 30W
- Night-time OTS 0100UTC to 0800UTC at 30W

8.3.4. Flight Planning.

- During the hours of validity of the OTS, flights are normally planned as follows:
 - in accordance with the OTS
 - along a route to join or leave an outer track of the OTS or
 - on a random route to stay clear of the OTS.
- The use of OTS tracks is not mandatory.

8.4. ATC FLIGHT PLAN AND OFP

- Example of item 10 in Flight Plan: B773/H-SXDHIRWYJ/SD
- In order to signify that a flight is approved to operate in NAT MNPS, the letter X shall be inserted within item 10 of the flight plan.
- Letter W must also be included in item 10 to indicate the flight is approved for RVSM operations.
- H which indicates carriage of HF radio
- Alphabet J indicates data link capability which should have an entry in the RMK section denoting DAT/SV where S indicates satellite link able and V indicates VHF link able. The second D alphabet indicates ADS capability
- Check that OFP reflects the correct NAT track routing.
- Check for correct Flight Level and Mach No. over Oceanic Airspace.

8.4.1. Master OFP symbols

- Use consistent symbology on the Master OFP.
 - A circle around the waypoint means the second crewmember has independently verified the entered coordinates and track/distances have been confirmed or crosschecked by the first crewmember.
 - In flight, a diagonal line (\) indicates that the crew has confirmed the coordinates of next way point.
 - X-symbol (X) indicates having flown overhead the way point.

8.5. PILOT PROCEDURES

8.5.1. Flight Planning

- Ensure the following documents are provided in addition to the normal briefing package:
 - NAT track message
 - North Atlantic plotting charts
 - Re-route form



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- Pilots must have a current track message even if filed for a random route. If filed on an OTS track, crosscheck OFP coordinates and planned flight level with track message.
- The planned oceanic route shall be plotted on the plotting chart.
 - If the flight is planned on OTS route, plot the immediate OTS track immediately to the North and South of the planned track.
 - If the flight is planned on a random route, plot the nearest OTS track for awareness purposes in case the crew needs to execute a contingency.
- Re-route forms are used in flight when cleared on an oceanic route different from that requested on the filed flight plan.
- If time permits, the cruise team shall plot the OTS tracks and/or the random route on the plotting chart prior to departure.

8.5.2. Preflight

- Review the Aircraft Technical Log (ATL) for any deferred defects which may affect operations and consult the B777 Minimum Equipment List (MEL).
- Focus on any technical entries that may affect operations in MNPS and RVSM airspace, ETOPS, and HF radio operations when flying across the North Atlantic.
- Ensure clock is set to UTC. This AIMS UTC time comes from GPS.
- If GPS is not available obtain a time check from **WWV** which is operational H24 on **2500 kHz, 5000 kHz, 10,000 kHz and 20,000 kHz** (AM/SSB) and provides UTC (voice) once every minute.
- An HF check should be conducted on the ground. This shall not be accomplished during refueling operations. Carriage of HF transceiver is mandatory in NAT airspace.
 - SELCAL check can be performed with **STOCKHOLM radio: 5541; 8930 11345; 13342; 17916**
- Both primary altimeters must agree within 75 feet of airfield elevation.
- Oceanic waypoint coordinates are to be entered into the FMCs exactly as stated on the master OFP. Any abbreviated coordinates (encoded as per ARINC specification 424, e.g. N50W060 is encoded as 5060N) can be checked in its expanded format on the NAV/DATA page.
- If this is not possible, Oceanic waypoint coordinates are to be entered into the FMCs as a latitude and longitude display in a seven-character format. Latitude and longitude waypoints are entered with no space or slash between the latitude and longitude entries. Leading zeroes must be entered.
 - N55° W030° is entered as N47W008 and displays as **N55W030**
- On the ground waypoint coordinates are to be entered by the PF and independently verified by the PM. To prevent a human factors issue which is based on seeing what we expect to see, read from the CDU back to the master OFP when verifying data.
- Perform a True track and distance check from oceanic entry to exit. The tolerances are **+/- 2 degrees for heading** and **+/- 2 nm for distance**.

8.5.3. Prior to Oceanic entry

8.5.3.1. System Accuracy and Serviceability

- Review aircraft technical status.
- Prior to entering MNPS Airspace, the accuracy of the LRNSs should be thoroughly checked, if necessary by using independent navigation aids. Carry out a 'reasonableness' check of the FMS/GPS position, using (for example) DME/VOR distance and bearing.
- Record RNP/APN on OFP prior to oceanic entry. RNP should be left in the default value.
- Record the Primary and Standby Altitude reading on the OFP. The two primary altimeters must be within **200 feet** of each other.
- Determine altitude capability and step climb with assigned Mach No.
- Perform HF/SELCAL check prior to Oceanic entry if it was not done earlier.

8.5.3.2. Air Traffic Control

8.5.3.2.1. Oceanic Clearance

- Obtain the Oceanic clearance:
 - via voice **at least 40 minutes** before the oceanic entry point or
 - via ACARS **30 to 90 minutes** prior to oceanic entry.
- **Both** Pilots must monitor the oceanic voice clearance using headsets.
- The oceanic clearance typically includes a route, flight level and assigned Mach number. Pilot should include their requested flight level in their initial clearance request.
- Some oceanic centers require pilots to advise them "**When Able Higher**" (WAH).

Example:

Oceanic Clearance voice request.

Etihad 140 request oceanic clearance. Estimate GOMUP at 10:47. Request Mach decimal eight four, flight level three five zero, able flight level three six zero, second choice track Charlie.”

Example of an Oceanic clearance:

*“Etihad 140 is cleared to Toronto via track **B**ravo, from Gomup maintain flight level three five zero, Mach decimal eight three”.*

Pilot's readback:

*“Etihad 140 is cleared to Toronto via track **B**ravo **146**, from Gomup maintain flight level three five zero, Mach decimal eight three”.*

- Readback of the full coordinates of the track is not required if the **TMI** is included in the readback.
- If Oceanic Clearance is not received prior to reaching the **Shanwick OCA** boundary, contact Domestic ATC and request instructions to remain clear of Oceanic Airspace whilst awaiting such Clearance. This is not the case for other NAT OCAs into any of which flights may enter whilst pilots are awaiting receipt of a delayed Oceanic Clearance.
- Obtain Oceanic Clearance prior to entering these other NAT OCAs; however if any difficulty is encountered, do not hold while awaiting Clearance unless so directed by ATC. In such circumstances, pending receipt of the Oceanic Clearance, continue to maintain the flight level cleared by the current control authority.
- The Specific Procedures for each Oceanic Area Control Centers are available on the Atlantic Orientation Charts.

8.5.3.2.2. Re-clearance

- Complete the oceanic re-route form.
- Both pilots should receive and confirm the new routing and conduct independent crosschecks after the FMC, Master OFP and Plotting Chart are updated.
- Check the True course and distance between the new waypoints. (The initial great circle true track and distance tables are found on the reverse of the plotting chart).
- **Re-clearance:**
 - Fill up Re-Route form (becomes Master OFP if new OFP can not be printed)
 - Obtain new OFP from NOC where possible.
 - Send re-clearance message to NOC
 - Provide ETA and estimate fuel remaining over the last waypoint before route change.
 - Follow up with SATCOM call if no acknowledgement within 5 mins.
 - Re program FMC routing. Print updated OFP from the RTE page.
 - Recalculate ETP if required

8.5.3.2.3. ADS/CPDLC

- Log on to the appropriate FIR **15 to 45** minutes prior to the oceanic boundary to establish an ADS or CPDLC connection. Use the exact flight number as specified on the master OFP e.g. ETD 141.
- Request for Oceanic clearance **must not** be made through CPDLC. It should only be made through voice or ACARS.

8.5.4. Within Oceanic Airspace

8.5.4.1. Heading Reference

- Select and leave the Heading Reference (HDG REF) switch to TRUE until Oceanic exit point or when entering radar controlled airspace whichever is earlier.
- OFP and plotting charts provide initial (Great Circle) True track for reference.
- Heading Reference Switch should be left in TRUE while operating within Oceanic airspace.

8.5.4.2. Altimeter checks

- Record primary and standby altimeter readings together with time every flight hour.
- Check both primary altimeters which must be within 200 ft of each other. This check is conducted while at level flight. The stand-by altimeter should also be noted.
- The altimeter readings should be recorded along with the time.

8.5.4.3. Transponder

- **Squawk 2000;** thirty minutes after Oceanic entry.

8.5.4.4. Mach Number

- Set the assigned Mach number. Constant Mach number to be flown over the oceanic area.
- If an immediate temporary change in the Mach number is essential, e.g. due to turbulence, ATC must be notified as soon as possible.

8.5.4.5. Communications

- After going beyond the range of the assigned VHF frequency, set left VHF to air to air **123.45** and right VHF to **121.5**.
- Be vigilant in passing an accurate ETA to ATC for the next waypoint. A change of **three** minutes or more requires that ATC be notified in a timely manner.

POSITION REPORT VIA CPDLC

If position report via CPDLC is required or requested, enter the seven-character format for latitude and longitude waypoints on the position report page. Shortened code (encoded as per ARINC specification 424, e.g. 5060N) is not accepted.

VOICE COMMUNICATION

POSITION REPORT

Example: "Position, Etihad 141, on 8831, RESNO at 1235, Flight Level 330, Estimating 56 North 020 West at 1310, 56 North 030 West Next"

REQUEST CLEARANCE

Example: "Request Clearance, Etihad 140, on 8831, 56 North 020 West at 1308, Flight Level 330, Estimating 56 North 030 West at 1340, 56 North 040 West Next. Request Flight Level 350"

Or if a position report is not required

Example: "Request Clearance, Etihad 140 on 3476, Request Flight Level 370"

REVISED ESTIMATE

Example: "Revised Estimate, Etihad 141 on 3476, 57 North 040 West at 0305"

IF WEATHER REPORT IS REQUIRED OR REQUESTED

Example: "Position, Etihad 141, on 8831, RESNO at 1235, Flight Level 330, Estimating 56 North 020 West at 1310, 56 North 030 West Next. Wind 230 diagonal 45, temperature minus 55".

8.5.4.6. Strategic Lateral Offset Procedure (SLOP)

- SLOP was developed to reduce the risk from highly accurate navigation systems or operational errors involving the ATC clearance. It also replaced the contingency procedure developed for aircraft encountering wake turbulence.
- SLOP is flown only to the right, 1 NM or 2 NM, of centerline.
- Aircraft that does not have an automatic offset capability (that can be programmed in the FMC) should fly the centerline only.
- ATC does not need to be notified.

8.5.4.7. Step Climbs

- Always report to ATC immediately upon leaving the old and on reaching the new cleared flight level.
- Ensure that the vertical closure speed is not excessive when approaching the cleared flight level. It is considered that, with about 1500 ft to go to a cleared flight level, vertical speed should be reduced to a maximum of 1500 ft per minute and ideally, to between 1000 ft per minute and 500 ft per minute.
- Ensure that the aeroplane neither undershoots nor overshoots the cleared level by more than 150 ft, manually overriding if necessary.

8.5.4.8. Approaching Waypoints

- Within a few minutes of crossing an oceanic waypoint **PM** should crosscheck the coordinates of that waypoint and the next waypoint.
- This check should be done by comparing the coordinates against the Master OFP based on the current effective ATC clearance.
- Cross Check the initial True Track and distance of the next waypoint against the OFP.
- Display present FMC position on the CDU when approaching waypoints.

8.5.4.9. Overhead Waypoints

- Ensure that the aircraft transitions to the next leg. This is confirmed by noting the initial True track and distance to the next waypoint compared against the Master OFP.

8.5.4.10. After Waypoint Passage

- Approximately 10 minutes after passing an oceanic waypoint, plot the latitude, longitude and time on the plotting chart. It is approximately 2 degree longitude after the last waypoint.
- Plot the position with time on the plotting chart using FMC position brought down to the scratchpad.
- Record ANP at each waypoint plotted.

8.5.5. Approaching Oceanic Exit Point

- Remove the strategic lateral offset procedure and confirm with ATC the routing and speed after exit point.
- Select the Heading Reference switch back to Normal (NORM).

8.6. IN-FLIGHT CONTINGENCIES

8.6.1. Introduction

- If unable to continue the flight in accordance with ATC clearance, request a revised clearance at the earliest possible time.
- Precede with the radio telephony distress (MAYDAY) signal or urgency (PAN PAN) signal as appropriate.
- If prior clearance cannot be obtained, an ATC clearance should be obtained at the earliest possible time and, in the meantime, the aircraft should broadcast its position (including the ATS Route designator or the Track Code as appropriate) and its intentions, at frequent intervals on 121.5 MHz (with 123.45 MHz as a back-up frequency).

- It must be recognized that due to the use of SELCAL with HF communications in North Atlantic operations, pilots' situation awareness, of other potentially conflicting traffic, may be non-existent or incomplete.
- If within an area where ATC communications are being conducted on VHF, pending receipt of any re-clearance, the position and intentions should be broadcast on the current control frequency, rather than 123.45 MHz.
- Until a revised clearance is obtained the specified NAT in-flight contingency procedures should be carefully followed.

8.6.2. Leaving the Track

- Leave assigned route or track by initially turning at least 45° to the right or left whenever this is feasible.
 - Turn away from nearest track or route, terrain and traffic.
 - Turn towards alternate or diversion airport.
- If able to maintain assigned flight level, after deviating 10 NM from track centerline :
 - climb or descend 1000 ft if **above FL410**
 - climb or descend 500 ft when **below FL410**
 - climb 1000 ft or descend 500 ft if **at FL410**
- If unable to maintain assigned flight level, whenever possible, initially minimize rate of descent when leaving original track centerline and then expedite descent to a feasible flight level which differs from those normally used by:
 - **500 ft if below FL410 or**
 - **1000 ft if above FL410.**
- Before commencing any diversion across the flow of adjacent traffic, whilst maintaining the **15 NM offset track**, expedite climb above or descent below the vast majority of NAT traffic (i.e. to a level above FL410 or below FL285), and then maintain a flight level which differs from those normally used by:
 - **1000 ft if above FL410, or**
 - **500 ft if below FL410.**
- However, if unable or unwilling to carry out a major climb or descent, then any diversion should be carried out at a level 500 ft different from those in use within MNPS Airspace, until a new ATC clearance is obtained.

8.6.3. Weather Deviation

- If prior ATC clearance cannot be obtained, the procedures described below should be adopted and efforts should be continued to obtain an appropriate ATC clearance.
 - If possible, deviate away from the organized track or route system;
 - Establish communications with and alert nearby aircraft broadcasting, at suitable intervals: aircraft identification, flight level, aircraft position (including ATS route designator or the track code) and intentions, on the frequency in use and on frequency 121.5 MHz (or, as a back-up, on the VHF inter-pilot air-to-air frequency 123.45 MHz)
 - Watch for conflicting traffic both visually and by reference to ACAS/TCAS
 - Turn on all aircraft exterior lights.

- For deviations of less than 10 NM, aircraft should remain at the level assigned by ATC
- For deviations of greater than 10 NM, when the aircraft is approximately 10 NM from track, initiate a level change of 300 ft.
 - A magnetic track of 000° to 179°
 - Deviating left (i.e. north) descend 300 ft;
 - Deviating right (i.e. south) climb 300 ft.
 - A magnetic track of 180° to 359°
 - Deviating left (i.e. south) climb 300 ft;
 - Deviating right (i.e. north) descend 300 ft.
- When returning to track, regain the last assigned flight level, when within approximately 10 NM of centre line.
- Inform ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to the centre line of its cleared route.

8.6.4. Communication Failure

Below is the summary of Operational Procedures Required following Loss of Air/Ground ATS Communications in the NAT Region. The details of these procedures are available in the *Atlantic Orientation Charts*.

- Communication Failure before receiving an Oceanic Clearance:-
 - Divert or fly the Flight Plan route, speed and initial planned oceanic level to landfall.
- Blackout encountered (in an HF comms Domestic ATC environment) before receiving an Oceanic Clearance:-
 - Continue at Domestic cleared level and follow flight planned route and speed to landfall.
- Communication Failure or Blackout after receiving an Oceanic Clearance:-
 - Fly that clearance to landfall.
- In all cases, after landfall rejoin, or continue on, the flight planned route, using appropriate State AIP specified procedures for the domestic airspace entered.



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